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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/928,115	08/10/2001	Stephen L. Hoyle	10992470 -1	6265

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EXAMINER	
ANYA, CHARLES E	
ART UNIT	**PAPER NUMBER**
2126	

DATE MAILED: 01/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application N .	Applicant(s)	
	09/928,115	HOYLE, STEPHEN L.	
	Examin r	Art Unit	
	Charles E Anya	2126	

-- The MAILING DATE of this communication appears on the cover sheet with the corresp ndence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 August 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-19 are pending in this application.

Claim Objections

2. Claims 1-13 are objected to because of the following informalities:

a. The following phrases in claims 1 and 8 appear to include typographical error.

i. "memory accessible" (lines 8 and 7 of claims 1 and 8 respectively).

ii. "data structure" (lines 14 and 13 of claims 1 and 8 respectively).

For the purpose of this office action the Examiner change the phrases "memory accessible" to "the global memory accessible" and "data structure" to "the data structure" respectively.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 15,16,18 and 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

b. The following sentences lack antecedent in basis:

iii. "A method in accordance with claim 13 wherein the synchronization objects are mutexes" – claims 15 and 18 lines 1-2 --;

iv. "A method in accordance with claim 13 wherein the synchronization objects are semaphores" – claims 16 and 19 lines 1-2 --;

For the purpose of this office action the Examiner change the sentences (for claims 15 and 16) "A method in accordance with claim 13 wherein the synchronization objects are mutexes" to "a set of synchronization software computer program designed for use in conjunction with a multi-computer system in accordance with claim 14 wherein the local or global synchronization objects are mutexes and "A method in accordance with claim 13 wherein the synchronization objects are semaphores" to "a set of synchronization software computer program designed for use in conjunction with a multi-computer system in accordance with claim 14 wherein the local or global synchronization objects are semaphores".

For the purpose of this office action the Examiner change the sentences (for claims 18 and 19) "A method in accordance with claim 13 wherein the synchronization objects are mutexes" to "a set of synchronization software computer program designed for use in conjunction with a multi-computer system in accordance with claim 17 wherein the local or global synchronization objects are mutexes and "A method in accordance with claim 13 wherein the synchronization objects are semaphores" to "a set of synchronization software computer program designed for use in conjunction with a multi-computer system in accordance with claim 17 wherein the local or global synchronization objects are semaphores".

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-3 and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 6,823,511 B1 to McKenney et al. in view of U.S. Pat. No. 6,353,869 B1 to Ofer et al.

7. As to claim 1, Mckenney teaches a multi-computer system having provision for global synchronization objects comprising: a plurality of multi-processor nodes each having provision for local memory, threads, and an operating system having the ability to manage local synchronization objects (figure 1 Col. 5 Ln. 13 – 47, Col. 6 Ln. 62 – 65, Col. 7 Ln. 1 – 2); global memory accessible to the processors on all the nodes and having at least one spinlock (Local Memory 26 Col. 5 Ln. 45 – 48, Col. 8 Ln. 27 – 34); a data structure in the global memory accessible by all the processors wherein one or more records for global synchronization objects may be established ((Local Memory 26 Col. 5 Ln. 45 – 48, Col. 8 Ln. 27 – 34), and a synchronization software system of programs established in all the nodes which, at the request of a thread running on a node, can create, open, request, release, and close a global synchronization object,

using the above spinlock and the data structure ("...functions or primitives..." Col. 7 Ln. 18 – 28), and using local synchronization objects created by the local operating systems on nodes having threads awaiting access to resolve requests for the synchronization object between threads residing on the same node (Table 1 Col. 7 Ln. 38 – 61).

8. McKenney does not explicitly teach a data structure including provision for recording in a queue the identity of nodes having threads awaiting access to the synchronization object and queue of node identities to resolve requests for the synchronization object as between threads residing on different nodes.

9. Ofer teaches said data structure including provision for recording in a queue the identity of nodes having threads awaiting access to the synchronization object/and queue of node identities to resolve requests for the synchronization object as between threads residing on different nodes (Lock Request Queue 46 Col. 6 Ln. 36 – 41, Queue 46A Col. 9 Ln. 66 – 67, Col. 10 Ln. 1);

10. It would have been obvious to one of ordinary skill in the art the time the invention was made combine the teachings of Ofer and McKenney because the teaching of Ofer would improve the system of McKenney by synchronizing accesses to shared resource via lock request queue such that data consistency is provided (Col. 6 Ln. 21 – 23).

11. As to claim 2, Ofer teaches a multi-computer system in accordance with claim 1 wherein the queue in which is recorded the identity of the nodes having threads awaiting access to the global synchronization object is organized as a FIFO

arrangement of the node identifiers ordered in the same order in which requests for the global synchronization object are received from the threads (figure 4B Col. 10 Ln. 7 – 16).

12. As to claim 3, Ofer teaches a multi-computer system in accordance with claim 2 wherein node identifiers are moved to the end of the queue each time one of the threads on the correspondingly identified node gains ownership of the local and global synchronization objects (Col. 10 Ln. 13 – 15).

13. As to claim 7, McKenney teaches a multi-computer system in accordance with claim 1 wherein the global synchronization objects are semaphores ("...semaphores..." Col. 7 Ln. 33 – 34).

14. As to claims 8-10, see rejection of claims 1-3 above.

15. Claims 4-6 and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 6,823,511 B1 to McKenney et al. in view of U.S. Pat. No. 6,353,869 B1 to Ofer et al. as applied to claim 3 above, and further in view of U.S. Pub. No. 2001/0014905 A1 to Onodera.

16. As to claim 4, McKenney as modified by Ofer is silent with reference to a multi-computer system in accordance with claim 3 wherein counts are maintained for each

node of the number of threads awaiting a synchronization object, wherein those counts are decremented when a thread on the corresponding node is granted the synchronization object, and wherein the reference to the name of the corresponding node in the data structure is removed when the count reaches zero.

17. Onodera teaches a multi-computer system in accordance with claim 3 wherein counts are maintained for each node of the number of threads awaiting a synchronization object, wherein those counts are decremented when a thread on the corresponding node is granted the synchronization object, and wherein the reference to the name of the corresponding node in the data structure is removed when the count reaches zero (figure 3 (Steps 2060/2080) page 10 paragraph 0106, ("...queue..." (Step 2080) pages 10/11 paragraphes 0106/0117).

18. It would been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Onodera, McKenny and Ofer because the teaching of Onodera would improve the system of McKenny and Ofer by minimizing the number of memory synchronization commands and by not reducing processing speed attained along a frequent path (page 5 paragraph 0050/0051).

19. As to claims 5,6,11,12 and 13, see the rejection of claim 4 above.

20. Claims 14 – 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 6,3553,869 B1 to Ofer et al. in view of U.S. Pat. No. 6,748,593 B1 to Brenn r t al.

21. As to claim 14, Ofer teaches a method for granting threads running on various multi-processor nodes within a multi-computer system ownership of a global synchronization object comprising the steps of (figure 1 Col. 6 Ln. 21 – 67): maintaining a record of the state of the global synchronization object as free, owned, or in transition (Data Structure 463 Col. 10 Ln. 21 – 30); when a thread seeks ownership of the global synchronization object, granting the thread, through a spinlock mechanism, access to the status of the global synchronization object, and granting the thread ownership if the object is free (Col. 10 Ln. 21 – 30); if the object is not free (owned or in transition), adding the thread's node to a queue of nodes having threads awaiting ownership of the global synchronization object (Lock Request Queue 46 Col. 36 – 41, Col. 9 Ln. 66 – 67, Col. 10 Ln. 1), and when the global synchronization object ownership is released by a thread, placing the global synchronization object into its transition state, and then arranging for each node in the queue, in turn, to stop blocking threads on its node from seeking ownership of the local synchronization object, and permitting any thread that then gains ownership of its local synchronization object to resume execution and to gain ownership of the global synchronization object if the object is not owned (free or in transition), this process continuing until the global synchronization object is owned or until no more threads seek its ownership, at which point the global synchronization object enters its free state (figure 4B Col. 10 Ln. 7 – 17).

Ofer is silent with reference to permitting the thread to seek ownership of a local synchronization object established on the thread's node by a local operating system, but

temporarily blocking threads on the thread's node from seeking ownership of the global local synchronization object and forcing them into suspension.

22. Brenner teaches permitting the thread to seek ownership of a local synchronization object established on the thread's node by a local operating system, but temporarily blocking threads on the thread's node from seeking ownership of the global local synchronization object and forcing them into suspension (Dispatcher 150 Col. 4 Ln. 7 – 11).

23. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Ofer and Brenner because the teaching of Brenner would improve the system of Ofer by restricting access to run run queue in order to avoid alterations of the run queue while a dispatcher is attempting to dispatch a thread (Col. 4 Ln. 3 – 6).

24. As to claim 15, Ofer teaches a set of synchronization software computer program designed for use in conjunction with a multi-computer system in accordance with claim 14 wherein the local or global synchronization objects are mutexes ("...lock..." Col. 6 Ln. 21 – 58).

25. As to claim 16, Ofer teaches a set of synchronization software computer program designed for use in conjunction with a multi-computer system in accordance with claim 14 wherein the local or global synchronization objects are semaphores ("...lock..." Col. 6 Ln. 21 – 58).

26. As to claims 17-19, see the rejection of claims 14-16 respectively.

Conclusion

27. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles E Anya whose telephone number is (571) 272-3757. The examiner can normally be reached on M-F (8:30-6:00) First Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, An Meng-Ai can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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